

TAXONOMIC OBSERVATIONS ON BEES WITH
DESCRIPTIONS OF NEW GENERA AND
SPECIES (HYMENOPTERA;
APOIDEA)

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This paper is published at this time in order that the new generic and subgeneric names proposed can be used in a forthcoming paper on the classification of the Apoidea.

Genus HYLÆUS

Popov [1939, Comptes Rendus (Doklady) Acad. Sci. U.R.S.S., 25: 167-170] has recently reviewed the subgenera of this large genus. Our North American fauna, which is rather meagre as compared with that of the Old World, contains three named subgenera, *Hylæus* Fabricius s. str. (*cressoni* division of Metz), *Prosopis* Fabricius (*modestus* division of Metz), and *Paraprosopis* Popov (*asininus* division of Metz). In addition to these there are two other small and as yet unnamed Nearctic subgenera. They are characterized as follows:

Metziella new subgenus

Clypeus of male about as long as broad, anterior tentorial pits near middles of lateral margins; antennal scape not greatly thickened. Seventh abdominal sternum of male with apical lobes rather small, although slightly larger than usual in the subgenus *Prosopis*, not so produced and pointed apically as in that group, and abundantly hairy. Eighth sternum of male much as in *Cephalylæus*, median basal process (spiculum) broad and short, median apical process about half as long as disc of sternum, pointed apically, without hairs. Coxopodites of male genitalia not expanded basally.

Type: *Prosopis potens* Metz.

This subgenus is closest to *Prosopis* s. str., but the reduced eighth sternum and the broad clypeus indicate a possible relationship to *Cephalylæus*. So far as known it includes only the type species.

Cephalylæus new subgenus

Clypeus of both sexes about as broad as long or broader, male with anterior tentorial pits above middle of clypeus; supraclypeal area in male with

a longitudinal elevated ridge; antennal scape of male greatly expanded, at least as broad as long; seventh abdominal sternum of male with apical lobes small, broadly fused with distal part of sternum, and hairy on outer margins; eighth sternum of male reduced, basal process (spiculum) broad and rather short, distal process very short, hairless, acutely pointed. Coxopodites of male genitalia large, expanded basally and apically, apices each with a strong hairy ridge starting at inner apical angle and extending across the apex, basally along outer margin, thence across middle of ventral surface of gonocoxite to terminate at a small inner lobe.

Type: *Prosopis basalis* Smith.

This very distinct subgenus resembles certain Old World forms of the subgenus *Abrupta* in the enlarged male antennal scape, form of the clypeus and supraclypeal areas, etc., but differs from that subgenus in the small apical lobes of the seventh sternum, the very small and bare apical process of the eighth sternum of the male, and the form of the male genitalia.

In addition to *H. basalis* (Smith), this subgenus includes *H. nunenmacheri* Bridwell. It seems worth pointing out that while Metz's figures of the genitalia of other species are dorsal views, his figure of those of *H. basalis* is a ventral view.

GENUS PERDITOMORPHA

A topotypical specimen of *P. brunerii* Ashmead, the type species of this genus, was kindly loaned me by Dr. T. D. A. Cockerell. The glossa is short, bilobed much as in *Colletes*. Indeed the genus is apparently closely related to *Pasiphæ*, with which it agrees in wing venation, although it has usually been placed in the Panurgidæ.

GENUS CAMPTOPEUM

This is an Old World genus, characterized by having the subantennal plates considerably longer than broad as in *Epimethia*, *Panurginus*, *Pseudopanurgus*, *Psænythia*, *Protandrena*, etc. The numerous South American forms described in *Camptopæum* should all be placed elsewhere. One group having a submetallic abdomen without integumental markings has been separated as *Acamptopæum* (= *Liopæum*) by Cockerell. Certain other species (*brasiliense* Schrottky, *argentium* Friese) are to be placed in *Calliopsis* or its subgenus *Parafriesea*. The remaining South American species which I have examined [*nomadoides* Spinola,

trifasciatum Friese, *steinbachi* Friese, *ochraceum* Friese, *herbsti* Friese, *flaviventris* Friese, *difficilis* Friese, and *bifasciatum* (Friese) (described as *Psœnythia*)] agree with the North American *Nomadopsis* in the short subantennal areas, in the slightly produced median part of the apical margin of the clypeus, the produced portion overhanging the groove from which the apical fringe of long hairs arises, in the narrow stigma, in most cases in the shape of the marginal cell, etc. There is more diversity among these South American forms than among the North American *Nomadopsis*. In most of them the inner orbits diverge below, unlike those of the North American species. It seems best to include the South American species in the *Nomadopsis* at least until a satisfactory subgeneric division of that genus is proposed, and *Spinoliella* (type: *C. nomadoides* Spinola) must then be placed as a synonym of *Nomadoides*. As will be explained elsewhere, the North American species usually included in *Spinoliella* are to be called *Nomadopsis*.

The single North American species described as *Camptopœum* (*C. semirufum* Cockerell) is a *Pseudopanurgus* [*P. abdominalis* (Cresson)].

GENUS CALLIOPSIS

Perissander new subgenus

This subgenus resembles typical *Calliopsis* in the short, broad subantennal plates, the slender stigma, whose length from its base to base of vein r is little longer than the prestigma, at least in the female, thus differing from *Hypomacrotera*, in which the stigma is longer; abdomen without yellow integumental markings but with apical hair bands on the segments. The female, indeed, is scarcely separable from other *Calliopsis* except for the red abdomen and the slightly more parallel-sided distal part of the marginal cell. The male, however, is very unusual, as indicated below.

Middle tarsi slender, about three times as long as middle tibiæ; forewings bent abruptly posteriorly beyond apex of marginal cell, the wing tip being drawn out into a broad, posterior process; apices of forewings blackish; marginal cell elongate, slender, parallel-sided apically, much longer than cell 1st·M (Ross terminology); stigma more elongate than in female.

Type: *Calliopsis* (*Perissander*) *anomoptera* n. sp.

Calliopsis (*Perissander*) *anomoptera* new species

MALE: Length 5 mm. Pubescence sparse, yellowish white. Head considerably broader than long; clypeus but slightly protuberant, anterior margin

broadly and shallowly emarginate medially, angles on either side of emargination rounded; inner orbits slightly converging below; head shining, rather sparsely punctate, except for broad zone across face immediately in front of ocelli which is finely and closely punctate; face yellow nearly to level of anterior ocellus, the yellow indented on each side near eye by the small black facial fovea; antennæ yellow, flagellum more or less orange; labrum yellow; mandibles yellow, apices dark red; labial palpi short, first segment a little shorter than next two together, second segment but little longer than third which is subequal to fourth. *Thorax* black, finely punctate, scutum and scutellum rather closely so, dorsal area of propodeum finely roughened, the following parts yellow: posterior lobes of pronotum, posterior margin of pronotum above (yellow broken medially), area on posterior margin of pronotum below tubercle, tegulæ (except for translucent parts), ventral surface of thorax, lower half of mesepisternum, yellow extending up as a slender band to subalar pit, and legs (distal parts of middle and rear tarsi pale brownish); middle basitarsi longer than middle tibiæ and as long as next two tarsal segments together; posterior basitarsi longer than segments two to five together; wings clear, except for dusky portion from near apex of marginal cell to wing tip. *Abdomen* finely punctate, red, terga four to seven black (fourth reddish in holotype, nearly as red as third in some paratypes); posterior margins of terga two to five with bands of white pubescence.

FEMALE: Length 5 mm. Punctuation, form of clypeus, etc., similar to male. *Head* black, the subantennal areas, supraclypeal area, paraocular areas (pale areas narrowed at level of antennæ and irregularly truncated at level of lower margin of facial foveæ) and large area in upper part of clypeus cream color; labrum black, mandibles black with slight reddish tinge; antennæ black, under side of flagellum yellowish brown. *Thorax* black, posterior lobes of pronotum, broken lines on posterior dorsal margin of pronotum, and areas on tegulæ cream color; legs black, basal portions of outer side of fore and middle tibiæ cream color. *Abdomen* red, fifth and sixth terga black, posterior margin of fourth infuscated; posterior margins of terga one to four with with more or less broken bands of white pubescence; pubescence of fifth and sixth terga fuscous.

Holotype: male, allotype, female, and seven paratypes from Picacho Pass, Arizona, August 7, 1940, on a small *Euphorbia* (C. D. Michener). Two female paratypes from ten miles south of Tucson, Arizona, August 8, 1940 (C. D. Michener). I have also seen a female of this species from New Mexico. The holotype and allotype will be placed in the collection of the American Museum of Natural History, paratypes, in the collections of the California Academy of Sciences and the author.

This is the only known species of *Calliopsis* with a red abdomen, other forms so characterized described in this genus having been

removed to *Pseudopanurgus* and *Hypomacrotera*. The dark tips of the wings of the male suggest *Hypomacrotera*, but the relatively short stigma and short marginal cell in the female indicate the relationship of this form to *Calliopsis*. Many male *Calliopsis* exhibit somewhat elongate middle tarsi, a condition reaching its extreme in *C. anomoptera* but not found in *Hypomacrotera*.

GENUS CTENOPECTRA

The genus *Otenoplectra*, usually credited to F. Smith (1857), was described briefly by William Kirby and the original description should be cited thus: *Otenoplectra* Kirby, 1815, in Kirby and Spence, *Introd. Ent.*, 3: 681.

GENUS CONANTHALICTUS

This genus, described as a subgenus of *Halictus* by Cockerell in 1901, is apparently separable into at least two distinct subgenera. *Conanthalictus* s. str. contains *C. conanthi* Cockerell and *C. cotullensis* Crawford from New Mexico and Texas and may be recognized by the elongate oval head, with the antennæ separated from the epistomal suture by less than the width of an antennal socket, the antennal bases twice as far from the ocelli as from the anterior margin of the clypeus, the ocelli above a line drawn between the summits of the eyes, and the glossa rather elongate. Crawford's *Sphecodosoma* may be closely related to *Conanthalictus* s. str. The other subgenus of *Conanthalictus* may be characterized as follows:

Phaceliapis new subgenus

Head seen from front broader than long; antennæ separated from epistomal suture by diameter of antennal sockets; antennal bases scarcely one and one-half times as far from ocelli as from anterior margin of clypeus; line between summits of eyes passing through ocellar triangle; glossa about three times as long as broad.

Type: *Conanthalictus bakeri* Crawford.

In addition to the type species, this subgenus includes *C. macrops* Cockerell, *C. wilmattæ* Cockerell, *C. seminiger* Michener and several undescribed forms, all from California. All collect pollen from flowers of the Hydrophyllaceæ, most are oligolectic on *Phacelia*.

Genus *PARANTHIDIUM**Mecanthidium* new subgenus

Resembling *Paranthidium* s. str. in the straight subantennal sutures, long and nearly straight apical margin of the mandibles of the female, three-segmented maxillary palpi, rounded scutellum, presence of arolia, etc., but differing in the large size, elongate form, and the following other characters: second recurrent vein distad from second transverse cubitus by only two to three times width of a vein; seventh abdominal tergum of male with lateral lobes reduced to small inconspicuous angles, median portion produced to a long, somewhat downcurved, beaklike process tapering to a narrowly rounded apex; posterior lobes of pronotum each with a transverse lamella, smaller than in *Dianthidium* and reaching mesad of lateral extremities of meso-scutum; anterior face of mesepisternum separated from lateral face by weak carina.

The last two characters are shared by a few species of *Paranthidium* s. str.

Type: *Paranthidium (Mecanthidium) sonorum* n. sp.

Mr. H. F. Schwarz has kindly pointed out to me that *Dianthidium macrurum* Cockerell from Mexico is also a *Mecanthidium*. This subgenus seems to have certain features in common with the Old World *Rhodanthidium*, the form of the apex of the male abdomen apparently being similar. However, the gonocoxites are slender, not notched apically as in *Rhodanthidium*.

Paranthidium (Mecanthidium) sonorum new species

MALE: Length 17 mm. (abdomen straightened, 14 mm. in paratypes with curled abdomens). Color brownish red; tarsi yellowish; distal portions of antennæ fuscous; small inverted V-shaped black area enclosing ocelli, its arms extending toward antennal bases and (in paratypes) small blackish areas below antennal bases. Pubescence short, sparse, yellowish white. *Head* dull, finely and densely punctured; margin of clypeus broadly truncate, truncation crenulate with about eight small low, rounded convexities; mandibles tridentate, the low median tooth about midway between acute apical tooth and inner apical angle, which is rather sharp, right angular; labrum with two small adjacent basal tubercles one on either side of midline. *Thorax*: Scutum exceedingly dull, even more finely punctured than head; scutellum and axillæ punctured about as head; mesepisternum and upper half of metepisternum coarsely and closely punctate; lower half of metepisternum impunctate, finely lineolate; propodeum more finely punctate than mesoscutum but with small lineolate spaces between punctures in some areas. Wings dark brown, rather opaque. *Abdomen* with terga but little more finely punctured than mesepisternum and closely so, posterior margins narrowly impunctate; seventh tergum with small rounded lobe at each side and huge

median downcurved process tapering to narrowly rounded apex, and provided with longitudinal median dorsal impunctate elevated line; second sternum with posterior part transversely elevated, shining, impunctate; sixth sternum with two broad apical lobes separated by shallow notch; next sternum with two long, broad, rounded lobes separated by emargination as wide as a lobe.

FEMALE: Similar to male but basitarsi red, apical half of flagellum black, black areas below antennal bases larger, extending down to epistomal suture; clypeal denticulations four, larger than in male, in median part of truncation; cutting edge of mandible long, nearly straight with very feeble undulations indicating positions of teeth; sixth abdominal tergum broadly rounded, untoothed, slightly exceeded by sixth abdominal sternum; scopa rather sparse, pale yellowish brown.

Holotype: male from Estrella, Sonora, Mexico, October 2, 1933. Allotype, female from Estrella dist., Alamos, Sonora, Mexico, October 2, 1933. One female paratype, labelled as is the allotype; one male paratype labelled Sonora, Mexico, October 2, 1933, and one male paratype labelled merely Arizona. It seems almost certain that all but the last specimen are from the same locality. All are from the collection of Mr. G. E. Bohart, through whose kindness they have been made available to me. The holotype and allotype will be placed in the collection of the California Academy of Sciences, a paratype in the American Museum of Natural History, and the other paratypes in the Bohart collection.

This species differs from other American Anthidiini by the uniform red color, the dark color of the wings, etc.

Chalepogenoides new genus

Holmberg in 1903 (Anal. Mus. Nac. Buenos Aires, (3)2: 416) described the genus *Chalepogenus*. It agrees with *Lathanomelissa* and *Tapinotaspis*, described in the same paper, in the unmodified posterior legs of the male and the slender hind tibial spurs of both sexes. Numerous species of *Tetrapedia* s. l. (the type species of which has modified posterior legs in the male and broad, strongly pectinate inner hind tibial spurs in both sexes) exhibiting these characters have in recent years been transferred to Holmberg's genera, particularly to *Chalepogenus*. Holmberg's genera, according to his description and key, agree with *Tetrapedia* in having the second abscissa of vein M-Cu of the posterior wings little if any longer than vein cu-v. At least some of the species which have recently been placed in *Chalepogenus*,

however, have the second abscissa of $M + Cu$ two or three times as long as the nearly transverse $cu-v$, thus resembling *Exomalopsis* and *Ancyloscelis*. These latter species are therefore to be placed in *Chalepogenoides*, described as follows:

Small, shining, sparsely punctate forms with ample, infuscated wings, and often white or yellow face markings, at least in the male. *Head* with clypeus somewhat protuberant, lower lateral portions bent backward; summit of vertex but little elevated above summits of eyes; posterior margin of vertex limited by a carina which fades away at sides; first flagellar segment broader than long, most of flagellar segments a little longer than broad; labrum nearly twice as broad as long, apex subtruncate; mandibles bidentate; maxillary palpi six-segmented, one-half as long as postpalpal part of galea, second segment longest; paraglossæ very short; first segment labial palpi twice or more than twice as long as second. *Thorax* high, propodeum without horizontal basal area; anterior basitarsi flat, concave beneath, at least as broad as and about two-thirds as long as tibiæ; middle basitarsi nearly as long as middle tibiæ and as remaining tarsal segments together, as broad as tibiæ; middle coxæ markedly shorter than distance from summits to hind wing bases; middle tibial spur more than one-half as long as basitarsus, slender, abruptly bent at tip; posterior basitarsi as broad as rear tibiæ but shorter than the latter, as long as remaining tarsal segments together; posterior tibial spurs two on each leg in both sexes, slender; claws cleft in both sexes, inner teeth slightly shorter in females than in males; arolia present; posterior margins of middle and hind tibiæ and basitarsi of male with dense fringe of long, conspicuously plumose hairs; scopa consisting of long simple hairs mixed with shorter, conspicuously plumose hairs as in *Tetrapedia*; wings with stigma large, much broader than distance from inner margin of prestigma to wing margin, extending far beyond base of vein r ; submarginal cells three, first and third subequal in length on posterior margins, third narrowed one-third to nearly one-half toward marginal cell, second shorter than others, rather strongly narrowed toward marginal cell; marginal cell much longer than distance from apex to wing tip, apex bent rather strongly from wing margin and pointed, edges of cell subparallel throughout much of their lengths; wings hairy throughout, not papillate; posterior wings with jugal lobe about one-third as long as vannal lobe (both measured from wing base), vein $cu-v$ somewhat oblique, about one-half as long as second abscissa of $M + Cu$, which is about two-thirds as long as vein M . *Abdomen* with pygidial area of male absent, the seventh tergum being produced to an acute point, pygidial area of female reduced, its lateral bounding lines meeting well before apex of tergum, which is broadly rounded apically; sixth sternum of male with longitudinal median ridge sometimes elevated to a spine; seventh sternum of male with a pair of ornate apical lobes; eighth sternum of male with deep median apical notch; male genitalia with flattened gonostyli about as long as gonocoxites.

Type: *Chalepogenus leucostoma* Cockerell.

This genus includes also *C. mæstus* (Cresson), *lugubris* (Cresson), *calcaratus* (Cresson), *abdominalis* (Cresson), and probably some of the other species recently placed in *Chalepogenus*, such as *testaceus* (Smith), *flavus* (Smith), *hypoleucus* Cockerell, *amplipennis* (Smith), *bunchosiæ* (Friese), *glaberrima* (Friese), *nigripes* (Friese).

The only species of true *Chalepogenus* which I have seen is *globulosus* (Friese) (from Tobogal, Panama, det. Cockerell). Aside from the character of posterior wing venation, this form differs from *Chalepogenoides* in the presence of a pygidial area in the male, the larger pygidial area of the female which reaches the posterior margin of the tergum, and the larger jugal lobe of the posterior wings (one-half as long as vannal).

Chætostetha new genus

In this genus the middle tibial spurs and the inner spurs of the posterior tibiæ are broadly pectinate, much as in *Tetrapedia*, while the posterior wing venation is as in *Exomalopsis*, *Ancyloscelis*, and *Chalepogenoides*.

Rather large, shining forms. *Head* with clypeus somewhat protuberant, lower lateral portions bent backward; vertex little elevated above summits of eyes; posterior margin of vertex not delimited by a carina; first flagellar segment much longer than broad, longer than any other segment except last, but much shorter than scape; labrum much broader than long; mandibles with subapical inner tooth; maxillary palpi about one-half as long as galeæ, six-segmented, first segment shortest, second longest; first segment of labial palpi more than twice as long as second. *Thorax* high, propodeum virtually without horizontal basal area; anterior basitarsi broad, flattened, concave beneath; middle coxæ distinctly shorter than distance from summits to posterior wing bases; middle tibial spurs broadly pectinate except for slender hooked tips; posterior basitarsi short, as broad as tibiæ; inner hind tibial spurs broadly pectinate with fewer, more widely separated teeth than in *Tetrapedia*; claws cleft; arolia present; under surface of thorax and middle and posterior trochanters clothed with numerous, very coarse, unbranched bristles with strongly hooked apices; wings with stigma of moderately large size, broader than distance from inner margin of prestigma to wing margin, vein r arising basad of middle of stigma; submarginal cells three, first and third subequal in length on posterior margins, third narrowed less than one-half toward marginal cell, second shorter than others, somewhat narrowed toward marginal; marginal cell much longer than distance from apex to wing tip, apex bent gradually away from wing margin for nearly half length of cell; margins of cell subparallel for much of its length; wings hairy throughout, not papillate; posterior wings with jugal lobes about one-third

as long as vannal (measured from base), vein cu-v somewhat oblique, less than one-half as long as second abscissa of M + Cu, which is little shorter than vein M. Abdomen with first four sterna covered with uncinate bristles similar to those of under surface of thorax; pygidial area (of female) very large, considerably broader than long, bluntly pointed, transversely lineolate.

Males of this genus are unknown to me.

Type: *Exomalopsis pyropyga* Friese.

This genus contains also *Chætostetha saussurei* (Friese) (described as a *Tetrapedia*). *C. pyropyga* and *C. saussurei* differ from both *Tetrapedia* and *Exomalopsis* in size and habitus, as well as in numerous structural characters.

Genus **ANTHEDONIA** new name

This name is proposed for *Anthedon* Robertson, 1900, Trans. Acad. Sci. St. Louis, 10: 53, not Agassiz, 1846.

Genus XYLOCOPA

Ma (1938, Rec. Ind. Mus., 40: 265-329) has revised the Indian species of *Xylocopa* and has proposed a number of new subgenera, the names of two of which are preoccupied.

Maiella new name for *Orbitella* Ma, 1938, Rec. Ind. Mus., 40: 305, not Douville, 1915.

Ctenoxylocopa new name for *Ctenopoda* Ma, 1938, Rec. Ind. Mus., 40: 285, not McAtee and Malloch, 1933.